Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application. The following listing provides the amended claims with the amendments marked with deleted material in crossed out and new material <u>underlined</u> to show the changes made.

Listing of Claims:

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1. (Currently Amended) A method of identifying a set of routes for a net having a set of pins in a region of a design layout, the method comprising:

      a)   partitioning the region into a plurality of sub-regions,

      b)   identifying a first set of sub-regions containing the net's pins;

10   c)   based on the first set of sub-regions, identifying a first route that traverses a second set of sub-regions, wherein the first and second set of sub-regions have a particular relationship; <u>and</u>

      d)   based on the particular relationship, identifying a second route from the first route, wherein the second route traverses the first set of sub-regions.

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2. (Original) The method of claim 1 further comprising identifying the particular relationship between the first and second sets of sub-regions

3. (Currently Amended) The method of claim 2, wherein identifying the particular relationship comprises retrieving an indicia that specifies the <u>particular</u> relationship from a storage structure.

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4. (Original) The method of claim 2, wherein the first and second sets of sub-regions have a symmetrical relationship.

5. (Original) The method of claim 4, wherein identifying the second route comprises transforming the first route into the second route based on the symmetrical relationship.

6. (Original) The method of claim 5, wherein transforming the first route comprises rotating the first route about an origin by a particular angle.

7. (Original) The method of claim 5, wherein transforming the first route comprises flipping the first route about an axis.

8. (Original) The method of claim 5, wherein transforming the first route comprises rotating the first route about an origin by a particular angle and flipping the rotated first route about an axis.

9. (Currently Amended) A method of identifying routes for nets in a region of a design layout, layout, the method comprising:

a) partitioning the region into a plurality of sub-regions, and

b) for each particular net,

i) identifying a set of sub-regions containing the net's pins;

ii) retrieving a first set of routes for the identified set of sub-regions from a storage structure, wherein each route in the retrieved set of routes traverses a base set of sub-region sub-regions that has a particular relationship to the identified set of sub-regions; and

iii) identifying a second set of routes from the first set of routes based on the particular relationship between the base set of sub-regions and the identified set of sub-regions, wherein the second set of routes are routes for the particular net.

10. (Original) The method of claim 9 further comprising for each particular net identifying the particular relationship between the identified set of sub-regions for the net and the base set of sub-regions traversed by each retrieved route in the first set of routes.

11. (Currently Amended) The method of claim 9, wherein a first net's identified set of sub-regions is identical to the base set of ~~sub-region~~ <u>sub-regions</u> traversed by the first set of routes for the first net, wherein identifying the second set of routes for the first net comprises specifying the first set of routes as the second set of routes.

12. (Original) The method of claim 9, wherein identifying a second set of routes for a first net comprises rotating each of the routes in the first set of routes retrieved for the first net.

13. (Original) The method of claim 9, wherein identifying a second set of routes for a first net comprises flipping each route in the first set of routes about an axis.

14. (Original) The method of claim 9, wherein identifying a second set of routes for a first net comprises rotating each route in the first set of routes about an origin by a particular angle and then flipping each rotated route about an axis.

15. (Currently Amended) A computer readable medium that includes a computer program for identifying a route for a net in a region of a design layout, the computer program comprising:

   a)   a first set of instructions for partitioning the region into a plurality of sub-regions,

   b)   a second set of instructions for identifying a first set of sub-regions containing the net's pins;

c) a third set of instructions for identifying, based on the first set of sub-regions, a first route that traverses a second set of sub-regions, wherein the first and second set of sub-regions have a particular relationship; and

d) a third set of instructions for identifying, based on the particular relationship, a second route from the first route, wherein the second route traverses the first set of sub-regions.

16. (Original) The computer readable medium of claim 15 wherein the computer program further comprises a fourth set of instructions for identifying the particular relationship between the first and second sets of sub-regions.

17. (Original) The computer readable medium of claim 16, wherein the first and second sets of sub-regions have a symmetrical relationship.

18. (Original) The computer readable medium of claim 15, wherein the third set of instructions comprises a fourth set of instructions for transforming the first route into the second route based on the symmetrical relationship.

19. (Original) The computer readable medium of claim 18, wherein the fourth set of instructions comprises a fifth set of instructions for rotating the first route about an origin by a particular angle.

20. (Original) The computer readable medium of claim 18, wherein the fourth set of instructions comprises a fifth set of instructions for flipping the first route about an axis.

21. (Original) The computer readable medium of claim 18, wherein the fourth set of instructions comprises a fifth set of instructions for rotating the first route about an origin by a particular angle and flipping the rotated first route about an axis.

REMARKS

In the Office Action, the Examiner objected to claims 3, 9, and 11 for various informalities. Claims 1, 2, 4, and 15-17 were rejected under 35 U.S.C. § 102(b) as being

5 · anticipated by USP No. 5,789,936 issued to Chih-liang Cheng (hereinafter referred to as "Cheng"). The Examiner allowed claims 9-14 and stated that claims 3, 5-8, and 18-21 would be allowable if rewritten in independent form. Applicants have amended claims 3, 9, and 11 to address the Examiner's objections. Applicants have also amended claim 9 to ensure the consistent use of terms throughout the claim. Applicants have also amended claims 1 and 15 to

10 resolve certain informalities in these claims. No new matter has been added. Accordingly, claims 1-21 will be pending after entry of this Amendment.

I.   Allowed Claims

Applicants would like to thank the Examiner for allowing claims 9-14 and for indicating that claims 3, 5-8, and 18-21 would be allowable if rewritten in independent form including all

15 the limitations of the base claim and any intervening claims. Because the proper form for presenting claims 3, 5-8, and 18-21 may depend at least upon the allowability of claims 1 and 15, Applicants will present these claims in form for allowability after continuing to pursue the allowability of claims 1, 2, 4, and 15-17.

II.   Amendment to Claims 1, 9, and 15

20 Applicants have amended claim 9 to ensure the consistent use of terms throughout the claim. Particularly, the words "of sub-regions" have been inserted after the word "set" in line 6 of Claim 9. No new matter has been added. Applicants have also amended claims 1 and 15 to correct certain informalities in these claims.

III. Objections to Claims 3, 9, and 11

In the Office Action, the Examiner objected to claims 3, 9, and 11 for various informalities. Except as indicated below with respect to claim 9, Applicants have amended these claims in accordance with the Examiner's requirements. Accordingly, Applicants respectfully request withdrawal of the objections to claims 3, 9, and 11.

Applicants respectfully disagree with the Examiner's assertion that the word "first" should be inserted in front of the word "set" in line 7 of claim 9. Assuming that the Examiner was referring to the word "set" at the end of line 6 of claim 9 (rather than in line 7 of claim 9), the word "set" refers back to the "set of sub-regions" recited sub-operation i) of operation b) in claim 9. Because claim 9 only refers to one set of identified sub-regions, there is no reason to label the set as being "first". Applicants have therefore not added the word "first" in front of the word "set".

IV. Rejection of the Claims Under 35 U.S.C. § 102

In the Office Action, the Examiner rejected claims 1, 2, 4, and 15-17 under 35 U.S.C. § 102(b) as being anticipated by Cheng. Applicants respectfully submit that Cheng does not anticipate any of claims 1, 2, 4, and 15-17 for at least the following reasons.

In order for a reference to anticipate a claim, "every element of the claimed invention must be identically shown in a single reference." In re Bond, 910 F. 2d 831, 832, 15 USPQ 2d 1566, 1567 (Fed Cir. 1990) (emphasis added).

A. Claims 1, 2, and 4

Applicants respectfully submit that Cheng does not identically describe every limitation of claim 1. For instance, Cheng does not disclose, teach, or even suggest the following claim limitations of claim 1:

- based on the first set of sub-regions, identifying a first route that traverses a second set of sub-regions, wherein the first and second set of sub-regions have a particular relationship;

- based on the particular relationship, identifying a second route from the first route, wherein the second route traverses the first set of sub-regions.

Cheng describes a "look ahead" method for avoiding interconnect congestion. One embodiment described in Cheng entails setting a set of macrocells in a single region of an integrated circuit. This setting is designated as an initial condition. Next, an iterative arithmetic process is implemented which utilizes quadratic equations based on the weighted clique model of net routing. Among other things, each iteration splits any macrocell with severe overlapping into two sub-regions with balanced macrocell densities. This iterative process balances the routing resources and adjusts macrocell densities. Col. 3, lines 3-17 and Figure 1.

In contrast, claim 1 recites a method that identifies a set of routes for a net having a set of pins in a region of a design layout. The Examiner asserts that the claim 1 limitation of "identifying a first route" is described in Cheng because regions around the three pins illustrated in Figure 2 of Cheng illustrate the "first set of sub-regions" recited in claim 1 and because "other sub-regions that are not included in the first set of sub-regions may be called a second set of sub-regions" in this limitation. The Examiner fails to specifically identify the "other sub-regions" which he says illustrate the second set of sub-regions recited in claim 1. Applicants submit that nothing in Cheng identically describes a second set of sub-regions as recited in claim 1. Additionally, nothing in Cheng identically describes identifying a route (based on the first set of sub-regions) that traverses a second set of sub-regions as recited in the "identifying a first route" limitation of claim 1. The Examiner asserts that Figure 3 of Cheng illustrates the recited route. Applicants respectfully disagree. Figure 3 illustrates a tree diagram that shows how sub-regions

are split in accordance with an embodiment of Cheng. Col. 5, lines 51-57. Nothing in Figure 3 describes a route which is based on a first set of sub-regions and that traverses a second set of sub-regions. In light of the above, Applicants submit that Cheng fails to identically describe the "identifying a first route" limitation recited in claim 1.

5   In addition to failing to identically describe the "identifying a first route" limitation as recited in claim 1, Cheng also fails to identically describe the "identifying a second route" limitation recited in claim 1. Because, as describe above, Cheng fails to identically describe identifying a first route as recited in claim 1, it follows that Cheng also fails to identically describe "identifying a second route <u>from</u> the first route" (emphasis added) as recited in claim 1.

10   The Examiner asserts that Cheng describes identifying a second route from a first route based on a particular Steiner Tree relationship. Further, the Examiner asserts that "[i]n order to make a connection to a pin, the <u>second route</u> traverses the <u>first set of sub-regions</u>." Applicants respectfully disagree with both these of these Examiner assertions. Nothing in Cheng describes utilizing a Steiner Tree relationship to identify a second route from a first route, wherein the

15   second route traverses a first set of sub-regions. Recalling from above that the Examiner asserts that the "[t]hree sub-regions that contain the three pins" of Figure 2 describe the first set of sub-regions recited in claim 1, Applicants respectfully submit that nothing in Cheng describes or illustrates a second route identified from a first route which traverses "three sub-regions that contain the three pins". In addition, Applicants disagree with the Examiner's assertion that in

20   order to make a connection between pins, a second route must traverse a first set of sub-regions. In light of the above, Applicants submit that Cheng fails to identically describe the "identifying a second route" limitation recited in claim 1.

        Because Cheng fails to disclose, teach, or even suggest either of the "identifying" limitations of claim 1, Applicants respectfully submit that Cheng does not anticipate the subject

matter of claim 1. Applicants therefore respectfully request withdrawal of the rejection of claim 1 under 35 U.S.C. § 102(b) as anticipated by Chang.

Each of claims 2 and 4 are dependent, either directly or indirectly, upon independent claim 1. Therefore, claims 2 and 4 are patentable over Cheng for the same reasons that

5   independent claim 1 is patentable over Cheng.

B. Claims 15-17

Claim 15 is addressed to a computer readable medium that includes a computer program for implementing operations which are similar to the operations recited in claim 1. Accordingly, claim 15 is patentable over Cheng for the same reasons discussed above with respect to claim 1.

10   Because Cheng does not identically describe the limitations recited in claim 15, Applicants respectfully submit that Cheng does not anticipate the subject matter of claim 15. Therefore, Applicants request the withdrawal of the 35 U.S.C. § 102(b) rejection of claim 15.

Each of claims 16 and 17 are dependent, either directly or indirectly, upon independent claim 15. Therefore, claims 16 and 17 are patentable over Cheng for the same reasons that

15   independent claim 15 is patentable over Cheng.

V.   Information Disclosure Statement

Accompanying this Amendment is a 1449 form of an Information Disclosure Statement that Applicants are submitting concurrently with but separately from this Amendment. This Information Disclosure Statement lists and provides copies of several additional references for

20   the Examiner's consideration. The Examiner is requested to make these documents of record. Also attached is a second group of 1449 forms of Information Disclosure Statements that Applicants submitted on April 23, 2003 and October 14, 2003. The Examiner is requested to make these documents of record as well.

CONCLUSION

In view of the foregoing, it is submitted that all of claims 1-21 are in condition for allowance. Reconsideration of the rejections and objections is requested. Allowance is earnestly solicited at the earliest possible date.

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Respectfully submitted,

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Dated: *2-9-04*

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